AFGHANISTAN ENERGY STUDY

ENERGY PLANNING AND MODELING USING ONSSET WORKSHOP

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NEW DELHI, INDIA

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TRAINING CONTENTS AT A GLANCE

1. General introduction to modelling of electricity for all and energy resources assessment using Geographic Information system (GIS)

2. Analysis and planning of electrification using GIS

3. Introduction on Afghanistan Energy Study and ONSSET Model

4. ONSSET analysis for Afghanistan and interpretation of results

5. Results interpretation and visualization of ONSSET

CORRESPONDENCE TO WORK AREA

Participants of the training had background of MIS/Programming, GIS, Energy and Power and Academia. The workshop nearly corresponded to work area of all the trainees

- The interface and database of ONSSET interested MIS/programmers to understand the algorithms and programming technicalities of the tool.

- Interested Power engineer on how to use the tool for efficient and cost effective electrification planning

- Interested GIS folks on how to blend GIS well with ONSSSET for data visualization and analysis

- Interested academicians on how to get the knowledge back to their students and train them on practical uses of technology.

WHAT WE LEARNED

- Modelling techniques using GIS

- Data analysis for electrification planning

- ONSSET as a least-cost electrification planning and analysis tool

- Widened horizon for further tweaking ONSSET and adapting that to the context of Afghanistan

- Creating scenarios specific to Afghanistan context and analyzing the results through ONSSET.

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THE KEY TAKE AWAY FROM THE WORKSHOP

1. Overall enhanced familiarity of the Working Group with ONSSET, ArcGIS and Python programming

2. Enhanced enthusiasm about the usability of the ONSSET software for effective Lease Cost Electrification Planning – including increased awareness about the type of data required.

3. The importance of training and developing a local young cadre (University students) was found to be imminent to the success of the Least Cost Electrification Plan as they could be effectively used for on ground data collection.

4. The importance of housing the data in one central website (proposed to be the existing Afghanistan Energy Information portal) was discussed.

5. It was understood that Phase 2 of the Geo-spatial analysis and development of a Least Cost Electrification Plan will gain extensively by forging further on-ground partnerships.

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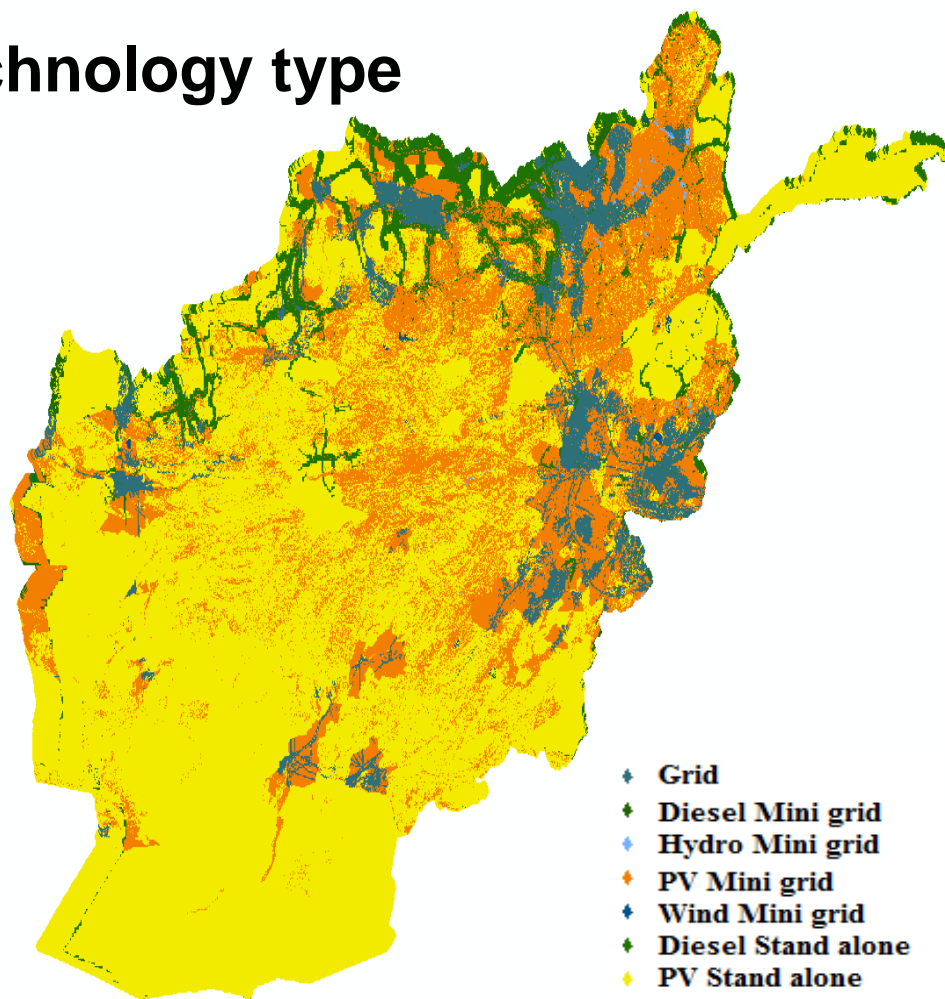
Electrification analysis – Scenarios

Important parameters and sensitivity

Scenarios	U5 - R3 (2657 kWh/hh/year)	U4 - R4 (2964 kWh/hh/year)	U4 - R2 (1635 kWh/hh/year)	U3 - R3 (1124 kWh/hh/year)
LD - 0.69 $/L	0.062	0.062	0.062	0.062
LD - 0.69 $/L	0.077	0.077	0.077	0.077
LD - 0.69 $/L	0.075 RE	0.075 RE	0.075 RE	0.075 RE
LD - 0.69 $/L	0.075 IM	0.075 IM	0.075 IM	0.075 IM
HD - 1.00 $/L	0.062	0.062	0.062	0.062
HD - 1.00 $/L	0.077	0.077	0.077	0.077
HD - 1.00 $/L	0.075 RE	0.075 RE	0.075 RE	0.075 RE
HD - 1.00 $/L	0.075 IM	0.075 IM	0.075 IM	0.075 IM

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Electrification analysis – U5 R3 LD 0.077

Results per technology type

People to receive electricity by 2030:	31,999,487		
Technology split out	Share (%)	Capacity (MW)	Investment (billion USD)
Grid extension	**44.9**	**1,225**	**9.84**
Mini grids	**41.4**	**1,252**	**5.7**
Diesel genset	0.8	12.8	**0.052**
PV system	40.0	1,228	**5.6**
Wind turbines	0.1	4.8	**0.021**
Mini – Small Hydro	0.5	6.6	**0.055**
Stand alone	**13.7**	**383**	**2.1**
Diesel genset	1.2	**20.6**	**0.06**
PV systems	12.5	**362.3**	**2.0**
Total	**100**	**2,860**	**17.58**

- Grid
- Diesel Mini grid
- Hydro Mini grid
- PV Mini grid
- Wind Mini grid
- Diesel Stand alone
- PV Stand alone

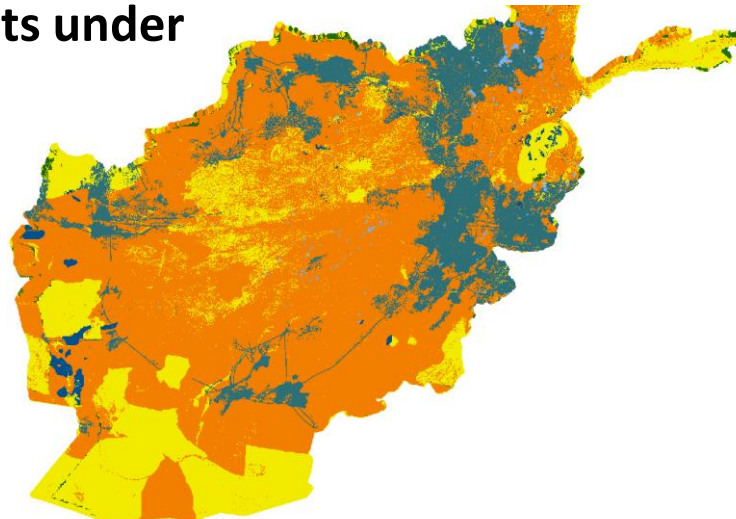**WORLD BANK GROUP**
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Electrification analysis – Results on ONSSET

U5 - R3, HD, 0.077
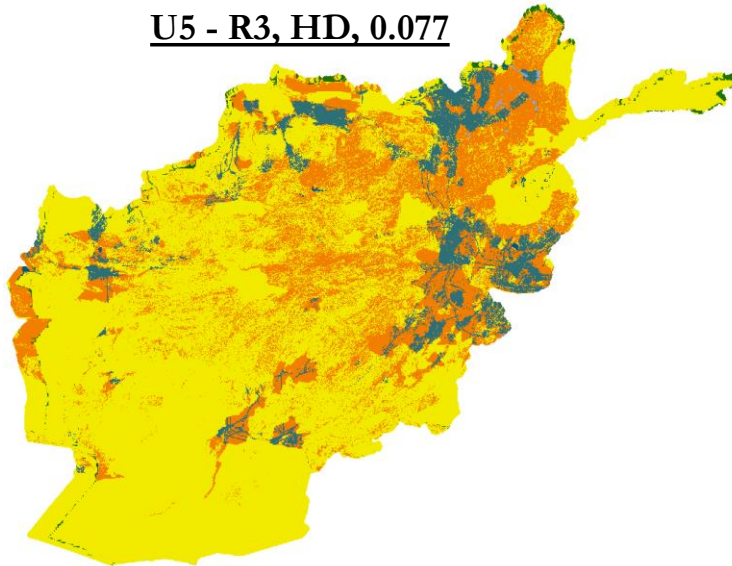
Compare scenario results under different:

1. Diesel prices
2. Grid electricity cost
3. Demand levels

U4 – R4, HD, 0.077

Legend:
- Grid
- Diesel Mini grid
- Hydro Mini grid
- PV Mini grid
- Wind Mini grid
- Diesel Stand alone
- PV Stand alone

OVERALL ASSESSMENT

- Both trainers Mr. Dimitris Mentis and Mr. Alexandros Korkoveslos were experts trainers and we thank them for the knowledge and expertise they shared with us.

- Also a big thank to the event manager and the team from world bank who arranged the workshop. The overall arrangement was very good

- Overall the training was fruitful and exposed the participants to the practical usage of technology i-e ONSSET for electrification planning

- Duration of the workshop was very short and participants had to digest a lot of stuff no time

RECOMMENDATIONS

- Strongly recommended to bring more energy, MIS and GIS experts on board for the upcoming sessions of the ONSSET workshops

- Trainees must not change over time from workshop to workshop.

- Workshop durations be relaxed in future so that trainees can better digest the stuff and come up with feedback on time.

- Universities be involved further to open up areas for students research purposes

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Thank you for your attention